

easterly current over the N.W. monsoon and of an upper current over the S.E. trade, more southerly than the surface wind, is not only altogether new, but also quite anomalous.

In Australia, and the Southern Hemisphere generally, the upper current over a N.W. wind is from about W. and over a S.E. wind from about E.

On my way home I ran a section across the Atlantic from Rio to Teneriffe, but the absence of cirrus prevented any satisfactory determination of the upper winds in that region.

The matter is, however, so important that I start again in a few days for the hurricane region of Mauritius, where I hope to observe one of these exceptional cyclones. Then I hope to repeat a section of the Indian Ocean between Mauritius and Bombay, and afterwards, if all goes well, to get some sections in the Pacific to see what the meaning of this curious discovery may be.

RALPH ABERCROMBY

21, Chapel Street, S.W., October 26

The Hellgate Explosion and Rackarock

THE statement in NATURE of the 15th inst. (p. 575) that rackarock is "blasting gelatine" or "nitroglycerine with compressed gun-cotton," is incorrect. Rackarock is simply powdered potassium chlorate, impregnated with an inexpensive oily combustible, such as coal-tar oil, and is one of my safety-explosives, which I discovered in 1870, patented in England, April 6 and October 5, 1871, and described more fully in the *Journal of the Chemical Society* for August, 1873, under the title: "On a New Class of Explosives, which are non-Explosive during their Manufacture, Storage, and Transport."

I am not responsible for the quaint name which the Americans have been pleased to give to my child.

As the so-called "rackarock" is not very sensitive or easy to explode, it requires a strong primer or detonator to set it off. This property, which I have fully discussed and particularly accentuated in my paper of 1873, explains why Gen. Newton, the Chief Engineer of the Hellgate mine, took the precaution of placing as a primer such a powerful charge (33 tons) of expensive dynamite on the cheaper charge of the potassium chlorate mixture (107 tons), a precaution carried here perhaps a little too far.

Still it is satisfactory to see that my safety-explosive performed the main part of the labour and rendered good service in the advancement of the works of peace.

H. SPRENGEL

Savile Club, 107, Piccadilly

[We are very pleased to insert Dr. Sprengel's correction as to the composition of "rackarock." Up to the time of our notice about the explosion going to press the only information we could obtain was that it was the same substance as blasting gelatine, but with a less portentous name.—ED.]

An Earthquake Invention

IN your number for October 15 (p. 573) your numerous scientific readers will be interested to find a pretty long letter under the above heading from so able a seismologist as Prof. John Milne, of Tokio, Japan. Yet, his invitation notwithstanding, I must decline any discussion with him, either about my old letters which he refers to, or his own much changed opinion on their subject, since the occasion for my writing them occurred.

Those points, Mr. D. A. Stevenson, who is also invited, may, or may not, take up. My letters were impersonal, and dealt only with a British Association Report. I desire also to continue to keep them strictly to that, even to the very words of the particular Report as given forth to the world with all the usually unquestioned authority of that mighty Association, in their B.A. volume for 1884, p. 248, Section entitled "Experiments on a Building to resist Earthquake Motion."

C. PIAZZI SMYTH

15, Royal Terrace, Edinburgh, October 16

On the Behaviour of Stretched Indiarubber when Heated

SOME time ago (NATURE, vol. xxv. p. 507) you permitted me to express a doubt as to the invariable success of an often-quoted experiment with cylinders of bismuth and iron, intended to illustrate some relations between specific heat and thermal conductivity.¹ I regret that I have made further progress along

¹ Perhaps I may mention in passing that if lead is substituted for the bismuth the experiment succeeds perfectly, as theoretically it should do.

the evil road of scepticism. I should like, in fact, to ask whether it is absolutely true to say without qualification, as is done in many text-books, that india-rubber (when stretched) forms an exception to the general law that the volume of a body is increased when the temperature is increased. The usual form of the experiment supposed to prove this is well known: a piece of india-rubber tube or cord is stretched by a weight connected with a long light index-lever, and it is shown that when heat is applied the india-rubber gets decidedly shorter.

I have always had some hesitation in showing and explaining the result of the experiment in the above way, especially as I could not find any proof given that the contraction in length was not compensated, or more than compensated, by an expansion in other directions (like that of a worm in its creeping progress, or of a dry rope when wetted). I had, in fact, lately arranged an apparatus for determining the coefficient of expansion of india-rubber, whether positive or negative, when I found that the subject has been very fully investigated by Dr. J. Russner, of Chemnitz (see Carl's *Repertorium* for 1882, pp. 161 and 196).

His results are briefly these:—

(1) That india-rubber (of which several kinds were examined) has without exception a definite coefficient of expansion which is always positive; experiments made at temperatures varying from 0° to 53°·4 gave, for its value at 10°, 0·000657; at 30°, 0·000670.

(2) That india-rubber in a stretched state expands to the same extent as when it is not stretched. No point of minimum density was observed, such as Puschl supposed to exist.

(3) That the apparently anomalous behaviour of stretched india-rubber when heated is simply a case analogous to those of anisotropic crystals, which expand to different extents in different directions. Iceland spar, for instance, as Mitscherlich showed, actually contracts in a direction at right angles to its principal axis when heated, although its volume is, on the whole, increased.

Although ordinary india-rubber is, of course, isotropic, yet when stretched it becomes anisotropic, as may easily be shown by stretching a piece until it is semi-transparent, and placing it between crossed Nicols; the direction of the strain lying at an angle of 45° with the plane of polarisation. Distinct colours, as with a selenite film, will be seen, varying from red to blue with the amount of strain.

The fact that india-rubber becomes hot when stretched, and especially if stretched and allowed to contract several times in succession, may perhaps be accounted for by molecular friction. It would almost seem, then, that in the account given in many books the truth, as well as the india-rubber, has been slightly "stretched."

H. G. MADAN

Eton College, October 23

The Resting Position of Oysters

IN carrying out a series of experiments on the artificial breeding of oysters in my private aquaria, I noticed that the young oysters born in the tanks rested on the flatter shell when they obtained a flat surface, such as a tile, to adhere to, but when I so arranged that they had irregular surfaces to deal with, such as little bundles of twigs, some adhered one way, and some the other. But where young oysters, nearly two years old, were moved from their original supports, and were compelled to find new ones, they selected the flat shell to rest upon in every instance, except where they were placed on sand, in which case they rested on the convex shell, in order apparently to avoid clogging the mouth of the shell with sand. Is it not possible from these observations that adult oysters vary their position according to the nature of the ground they are on. I have seen adult oysters on muddy ground lying on the convex shell, while where adhesion to a flat surface could be obtained, they were all on the flat shell, and pectens are dredged with Balari and other growths on the flat shell in some instances, and on the convex shell in others, principally, however, on the latter.

H. STUART-WORTLEY

South Kensington Museum, October 23

The Value of the Testimony to the Aurora-Sound

I HAVE read with much interest the descriptions of this sound as given by Dr. Sophus Tromholt's correspondents in NATURE of September 24. I was, however, struck by the similarity of these descriptions to the well-known phenomena of *tinnitus*

aurium, and it occurred to me that since a large number of persons have noises in the head—say one-half the entire adult population—it is probable that, when listening intently, a considerable number of observers heard the sounds of their own ears only. This is especially true of “sizzling,” “hissing,” and “buzzing” sounds.

If physicians affected with tinnitus are not careful to exclude the noises propagated in their own heads, they may discover many curious physical signs in the chests of their patients in making auscultatory examinations.

SAMUEL SEXTON

12, West Thirty-fifth Street, New York, October 12

The Red Spot on Jupiter

ON October 24, at 17h. 32m., this object was estimated exactly central on the planet. As seen with my 10-inch reflector, power 252, the spot was very plain, though the low altitude of Jupiter rendered the telescopic image far from good.

My impression is that this red spot is now decidedly more conspicuous than it was when I last saw it on July 8, and that during the ensuing opposition it will again attract general observation as one of the most prominent features of Jovian detail. This well-known marking has now been watched for more than seven years, and its present aspect leads to the inference that its existence will be indefinitely prolonged. We may therefore justly regard it as a lineament of singular permanency. Though its motion and appearance (*i.e.* tint) have been subject to considerable variation, there has been little, if any change in either the shape or size of the spot. The mystery regarding its origin and real nature may perhaps ultimately be revealed on the basis of renewed and more exact observation in future years.

W. F. DENNING

Bristol, October 25

A Remarkable Sunset

WHILE out for a walk this afternoon I was struck by a peculiarity in the sunset which I do not remember to have seen noticed before. The sun set about 4.43 p.m., and there was the usual “after-glow.” I began to notice this first about five o’clock; there was then in the west a large bank of cumulus cloud rather low down, above this was a brilliant lemon-yellow, very bright, and this was bounded by a broad arc of a pale pink, the latter fading away into the light blue of the sky. Very soon afterwards I noticed that the pink arc, instead of being continuous, was really made up of a series of beams of bright light, which pointed to the position of the sun. I counted these, and made out five bright rays at unequal distances apart; behind this (as it seemed) there were a few yellow cirrus clouds. A sunset like this I have often noticed before, but what followed is, I think, novel. The bright rays were slowly turning round like the spokes of a huge wheel moving in a direction contrary to the hands of a watch. I noticed also that the breadth between the bright rays altered, two of them seeming to almost coalesce. In about ten minutes’ time one ray turned approximately through 90°, and a new ray brighter than the other appeared on the right. The altitude of a ray when vertical was from 30° to 40°, I should say. By 5.15 the rays became very faint and soon vanished, though above the dark bank of cloud I could detect a faint crimson-lake glow.

The day had been fine on the whole, except that there had been a little rain early in the morning, and a very heavy rain shower between 12.30 and 1 o’clock. The air was extremely clear, and the wind was blowing freshly from the west, or perhaps it was a bit north of west. It was blowing slightly from right to left across the line joining me to the sun.

This phenomenon of the pink rays revolving seems to be explained by the dark spaces being due to clouds which were being hurried along by the strong west wind. I should like to know if any one living in a line W.S.W. of Cambridge noticed broken masses of cumulus clouds this afternoon *overhead* between 5.0 and 5.15 p.m. Greenwich time.

PAUL A. COBBOLD

Caius College, Cambridge, October 26

A Tertiary Rainbow

THE supposed tertiary rainbow about which I sent a note a month ago must have been a halo formed by ice crystals, as readers of NATURE will perhaps have inferred merely from the recorded distinctness of the colours. It did not occur to me

that ice crystals would be found in a horizontal direction from here, over the hot plains of the Punjab on the evening of an August day. But I have since calculated the size of the tertiary rainbow and the order of colours in it, and the calculation leaves no doubt that the phenomenon must have been a solar halo, caused perhaps by a hailstorm over the plains.

Thaudiani, Punjab, Sept. 25

T. C. LEWIS

The Sense of Colour

IN the early English “Lay of Havelok the Dane” the following words occur:—

“Also he wolde with hem leyke
That weren for hunger grene and bleike.”

Mr. Allan Cunningham in his interesting paper (p. 604) does not allude to this old use of the word green. Is it a solitary case?

MARGARET HEATON

Belvedere, October 24

Stone Axes, Perak

A CURIOUS Malay superstition has come to my knowledge concerning these implements. They appear to be very rare out here, and those found are treasured by Malays as lucky things to have about the house. I have as yet only been able to procure two specimens. One of these I have described in a paper on the Sakaies read before the Anthropological Society in June last. This nearly resembles Fig. 55 in Dr. Evans’ “ancient Stone Implements of Great Britain,” and is made of a soft description of slate which can be scratched with the thumb-nail. The other is of a much harder description of slate almost like greenstone; it much resembles Fig. 76 of the same work. It is $7\frac{1}{4}$ inches long, $1\frac{1}{2}$ inches wide at the widest end, which is sharpened, and $1\frac{1}{2}$ inches wide at the other end, which is not sharpened. The faces are flatter than those figured by Dr. Evans and the sides perfectly squared. It is beautifully polished, but several depressions are left all over it, showing that it had originally been chipped out. The Malays call them *Batu-lintarh*—*i.e.* thunderstones—and account for their presence by saying that they are the missiles used by angels and demons in their continual warfare.

But the peculiarity of the superstition is this: the Malays aver that the soft implement which I have described has been made by an angel or a demon and buried in the earth to become hard and fit for use, and support their argument by saying that these objects have been found freshly made of clay and quite soft, buried in the earth, where they have lately been deposited by some angel or demon for a future time of battle. The Malays say that the *bātu-lintarh* is hard to procure in this state, as it almost invariably drops to pieces. For this reason they do not value it much, and more particularly because it has never inflicted a wound. The hard polished celt which I have just described, however, they value very highly, because they say it has been used in the aerial warfare and has inflicted a wound on one or more of the combatants. They adduce this supposition from the fact of the several depressions left by the chipping out of the implement, and say that these marks were caused by its contact with the body of one of the demon combatants. This last idea is very closely connected with another Malay belief, and most probably took its rise from it. This belief is that if the blade of a kris or spear is bent or in any way damaged, it has most certainly wounded if not killed a man or some wild animal, and is therefore proportionately of much greater value. A Malay who professes to be a good judge of a kris will, if asked to appraise the weapon, invariably first glance along the blade to see if it is bent ever so slightly, and if it is he will most certainly add two or three dollars to its value because it has “*m’nikam orang*” (struck a man). I have very little doubt that if some of the fine limestone caves of this district were thoroughly examined, they would yield a rich harvest of anthropological material.

A. HALL

Batu Gaja, Kiuta, Perak, September 6

Photographic Action on Ebonite

AT the back of one of the cases of lecture apparatus facing a north window in this laboratory, there happens to have been standing for six months or more an ebonite plate with a framed glass plate in front of it, the glass having a star-pattern done in little spots of tinfoil all over it. The thickness of the